

## CLAIMS

1. A method for forming a silicon nitride film, comprising:  
accommodating a substrate in an internal space of a chamber;

supplying hexaalkyldisilazane

$((C_nH_{2n+1})_3SiNHSi(C_nH_{2n+1})_3)$  gas and a gas including a nitrogen compound that is plasma-excited to the chamber accommodating the substrate; and

depositing a reaction product of the hexaalkyldisilazane gas and the gas including a nitrogen compound that is plasma-excited on the substrate to form a silicon nitride film.

2. The method of claim 1, wherein the substrate is heated to room temperature to 800°C.

3. The method of claim 1 or 2, wherein the hexaalkyldisilazane is hexamethyldisilazane  $((CH_3)_3SiNHSi(CH_3)_3)$ .

4. The method of any one of claims 1 to 3, wherein the nitrogen compound is constituted by a gas including at least one of  $N_2$  and  $NH_3$ .

5. An apparatus for forming a silicon nitride film on a

surface of a substrate, comprising:

a chamber in which the substrate is accommodated in its internal space;

first gas supplying means for supplying hexaalkyldisilazane gas to the internal space of the chamber;

second gas supplying means for supplying gas including a nitrogen compound to the internal space of the chamber; and

plasma excitation means that is provided in the second gas supplying means, for plasma-exciting the gas including a nitrogen compound supplied to the internal space of the chamber.

6. The apparatus of claim 5, wherein a gas supplying portion of the second gas supplying means for supplying gas to the internal space of the chamber has an orifice structure.

7. The apparatus of claim 5 or 6, wherein heating means for heating the substrate is further provided.

8. The apparatus of any one of claims 5 to 7, wherein the hexaalkyldisilazane is hexamethyldisilazane, and the nitrogen compound is constituted by a gas including at least one of  $N_2$  and  $NH_3$ .